

ALASKA'S FIRE DEATHS: A COMPARATIVE ANALYSIS

Strategic Analysis of Community Risk Reduction

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ABSTRACT

Alaska has a fire problem. A person in Alaska, on average, is three times more likely to die in a fire than anywhere else in the United States. Given the fact that the United States in itself has historically one of the leading fire rates of any industrial nation worldwide does not bode well for Alaskans.

The problem that prompted this research is that Alaska's high fire death rate has remained high even while fire deaths in the rest of the nation have been falling indicating that current approaches for reducing Alaska's fire death rate have not been effective. The purpose of this research project was to define the significant characteristics of the Alaska fire death problem. Those influencing factors were identified to be used in community risk reduction efforts to help develop select strategies and tactics for Alaska's challenges with the ultimate goal of implementation and the reduction in fire fatalities. The research methods used to conduct this study were the historical and evaluative methods in attempt to discover the significant cause and effect characteristics of Alaska's fire death rate.

Research was used to answer the following questions:

1. To what extent does being a remote rural state with a harsh climate contribute to Alaska's fire death problem?
2. What role does poverty play in Alaska's fire death rate?
3. What are the identifiable, significant characteristics influencing Alaska's fire death rate?

Research through literature review was used to identify the potential characteristics that could be expected in an analysis of the Alaska's fire deaths. Once

the potential influencing factors were identified in relation to this project, national and state data were used for comparison of those characteristics and an evaluative analysis was used to answer the research questions. Characteristics and patterns to Alaska's fire challenges became apparent. Surprisingly, some traditional fire safety perceptions were not always the significant factors in Alaska's high death rates, even though many fire prevention officials and programs tend to focus only on traditional issues. Research found that poverty is not a major obstacle to Alaskan fire safety nor was being a large "rural" state with a low population density. Findings showed that Alaskans were most likely to die from fire in the home with heating and smoking as the most significant causes of fatal fires. Evidence was found that climate and the state of Alaskan housing had an amplification effect to the fire problem. Arson was found not to have a significant impact to life safety of Alaskans. This research did show that early warning by a working smoke detector to have the largest potential of lessening the severity of a fire in terms of fire deaths.

A summary of recommendations made as a result of this analysis of Alaska's fire deaths are as follows:

1. Assure at least one working smoke detector in every Alaskan home.
2. Build fire prevention coalitions to promote safe Alaska housing.
3. Revisit current fire prevention efforts and evaluate if they are efficient use of resources towards the Alaska's fire death problem as identified in this study.
4. Rethink statewide efforts on fire protection to differentiate the efforts that effectively protect property from those that protect lives.

TABLE OF CONTENTS

	PAGE
Abstract.....	ii
Table of Contents.....	iv
Introduction.....	1
Background and Significance.....	2
Literature Review.....	4
Procedures.....	12
Results.....	18
Discussion.....	26
Recommendations.....	30
References.....	32

INTRODUCTION

Alaska has a fire problem. According to the Alaska State Fire Marshal's Office ANFIRS data from 1990 to 1995 a person in Alaska is three times more likely to die in a fire than anywhere else in the United States. Given the fact, that the United States in itself has historically one of the leading fire rates of any industrial nation worldwide (USFA 1997) does not bode well for Alaskans. Traditional statewide and regional fire prevention campaigns, through the efforts of the local fire officials, state fire associations and the state fire marshals office seem to have little effect on changing the course of these tragic events. Reports of fatal fires are a weekly fact of life in the Alaskan news media. It is evident by the continuing statistics that the Alaskan community at large has not heeded any call to action.

The problem that prompted this research is that Alaska's high fire death rate has remained high even while fire deaths in the rest of the nation have been falling indicating current approaches for reducing Alaska's fire death rate have not been effective. The vision to where the state needs to be in fire safety has been strong, however, a clear and workable pathway to that vision has never materialized. Fire professionals have touted universal and commonly accepted fire solutions such as early detection; fire sprinklers, defensible space, improved fire suppression delivery and training, codes, and of course - increased fire prevention efforts. Alaskans have not been effective in implementing any of these strategies and tactics as it is currently unknown nor is there a consensus on which strategy would be the most effective to the desired goal.

The purpose of this research project is to define the significant characteristics of the Alaska fire problem. Once these influencing factors are identified, a plan can be developed with select strategies and tactics for Alaska's challenges with the ultimate goal of implementation. The research used to conduct this study were the historical and evaluative methods in attempt to discover the significant cause and effect characteristics of Alaska's fire death rate. Research was used to answer the following questions:

1. To what extent does being a remote rural state with a harsh climate contribute to Alaska's fire problem?
2. What role does poverty play in Alaska's fire rate?
3. What are the identifiable significant characteristics in Alaska's fire death problem?

BACKGROUND AND SIGNIFICANCE

Alaska is predominately a rural state with a population density of less than 1 person per square mile. It has a landmass of over 570,000 square miles, 1/6 the total of the Continental United States. Except for a few urban areas, communities are often isolated with great distances between each other and in many cases accessible only by air, boat, or winter trail. Half of Alaska's population (250,000) does, however, live in the Anchorage metropolitan - urban area, with other smaller urban areas in Fairbanks and Juneau. The rest of the state's population is in even smaller isolated city, rural, and bush communities. Bush, by Alaskan standards, meaning isolated by lack of highway. Alaska is a prosperous state, abundant with cultural diversity, natural resources, a frontier spirit, and in the past a

boom or bust economy. Rich oil and mineral resources, and the Alaska pipeline, has allowed the State of Alaska and its citizens to reap substantial financial benefits. During the 1980s, money for public projects and services was flush, As oil prices stabilized along with decreases in North Slope oil production, state revenues have become tighter in the 1990s. Funding for government programs have come under considerable more scrutiny. In response, the State Legislature has engaged in outcome focus planning that is known as performance based budgeting. This allocates resources to all programs, even those, that are needed in saving lives from fire.

Several Alaska fire service organizations have long waged a battle with Alaska's fire problems. The Alaska State Fire Marshal's Office has divisions of fire prevention and of technical assistance, which, due to the above stated economics, could be considered in a severe program contraction mode. The Alaska State Fire Chief's Association has been very active with the legislature on a yearly basis, pushing for increased funding for fire programs. The State Fire Chiefs also have a vision program called "SSD". This program envisions every Alaskan home having a smoke detector, sprinkler system, and defensible space. The State Chiefs have not been successful, to date, with the legislature gaining support for fire programs nor implementing their vision. The Interior Fire Chief's Association, in the Fairbanks area, has a comprehensive media fire prevention program with year-round traditional fire prevention announcements on radio and TV. The NFPA and the National Ad Council, also, provide additional fire prevention media messages. All fire departments in the interior Alaska Fairbanks region have aggressive traditional fire prevention campaigns during fire prevention week with school visits, smokehouse drills,

and public displays. Most other larger Alaskan community fire departments do the same. Anchorage and Fairbanks schools participate in the NFPA's *Learn Not to Burn* program. Unfortunately, the fire death in Alaska remains high, with little change.

The National Fire Academy course on Strategic Analysis of Community Risk Reduction provides a model to employ appropriate strategic processes when confronting a community risk issue such as Alaska's fire deaths. Part of this model is the analysis and evaluation which when done, comprehensively and properly will allow for effective program design. This consists of coalition building and interventions in education and behavior change, public policy, and engineering. (NFA 1997)

LITERATURE REVIEW

This applied research project started with a literature review of articles, books and other publications on the subject of fire deaths and their causes at the Learning Resource Center of the National Emergency Training Center in Emmitsburg Maryland. It continued at the University and State of Alaska Library systems located at the University of Alaska Fairbanks, and from materials on the Internet. There is an abundance of material on America's fire problem. Two Alaskan reports done in the early 1980's, on Alaska's fire safety crises, did provide useful information and are reviewed in this research paper further. Also, several unpublished papers found at the National Emergency Training Center's Learning Resource Center and from the Alaska State Fire Services also highlight the unacceptable fire death rates in Alaska.

In 1973, the National Commission on Fire Prevention and Control delivered a landmark comprehensive report titled *America Burning* to then president Richard M. Nixon on the nation's fire problem. The report provided insight on the characteristics of the fire "problem " in this country and provided 90 recommendations to move towards a fire safe America. This report has been considered ground zero for fire safety, which became a rallying point in the fire service for change and to what our current progress is measured from today. It was also one of the first projects to put a national focus on the fire problem and it's causes. Since the generation of *America Burning*, reported fire deaths in the United States has been reduced by 51% in the 20-year period from 1975 to 1994, according to data from the National Fire Data Center.

The characteristics of the nations fire problem as defined in *America Burning* (1973) that are of interest to this research are that eighty percent of fire deaths occur in residences. People living in rural areas and inner cities are two to three time more likely to die in fires in their homes than people in mid size cities and suburban areas. *America Burning* identified the poor, elderly, and young as being at the greatest risk from the occurrence of fire. The Report Commission, during its deliberations, uncovered many aspects of the nation's fire problems and as a result, made recommendations in these six strategic areas (pp. x -xi):

1. Emphasis on fire prevention.
2. Better training and education for the fire service.
3. Public education on fire safety.

4. Design and material contribution to unnecessary hazard.
5. Improvement of building fire protection features.
6. Expansion of research.

In 1980 the Alaska State Legislature chose to authorize and fund a special task force to study Alaska's fire problem. The task force had nine members, all professional public safety or governmental officials appointed by the Governor. This task force used *America Burning* (1973), and the work the National Commission on Fire Prevention and Control did in their report as an outline for studying Alaska's fire problem. What was to be a three-year project was only funded for two years cutting short the Commission's work. The Commission did, however, produce a report: *Alaska on Fire* (1982) which did confirm Alaska's extraordinary fire problem as "Alaska's fire death rate is the most horrible of all states"(p.10). Interestingly, even though the report did not define the characteristics of Alaska's fire problem, it did provide these recommendations (pp18-19):

- Master planning at the state level and be a function of the Governor's office
- Increased emphasis on education and fire prevention and arson investigation.
- State Department of Public Safety and Attorney Generals offices must devote more effort to arson.
- Increased fire training and certification programs
- Fire equipment and training grants and loans to Alaska communities
- Insurance company rate reduction for home fire surveys
- State Board of Education to support public fire education in the schools and recommended adoption of the NFPA's *Learn Not to Burn* program.

- Support for self-extinguishing cigarettes.
- Definition of, and improvements in, wildlands fire suppression.

In 1984 the State Legislature created enabling legislation for the Governor to appoint a “second” Task Force on Fire Prevention and Control which was given 120 days to complete the unfinished work of the first Task Force. The second Task Force had seven members this time, but still was of a similar make up as the first, and generated a report was titled *Alaska’s Public Safety Crisis* (1984). This second Task Force did attempt to analyze Alaska’s fire problem using data from 1979 to 1983 gathered from Alaskan departments participating in the Alaskan National Fire Incident Reporting System (ANFIRS) at that time. The Task Force found that fire occurs most frequently in residential structures. Almost all deaths in Alaska are a result of residential fires. Fire deaths in the rural areas of the state were higher than those of urban areas. (p.12)

The *NFPA Fire Protection Handbook* (Hall & Cote, 1997) also helps provides the framework for characterizing the fire problem and its patterns.

“Every hostile fire requires an initial heat source, an initial fuel source and something to bring them together. That something is nearly always a human component, usually an immediate act or omission that brings heat and fuel together or sometimes the delayed effects of an error in design or installation. Fire also requires oxygen and a sustainable chemical reaction. These components of heat, fuel and human error are central to nearly all fires and can be used as a framework for thinking about fire prevention.” (pp. 1-9)

The *Use of Fire Incident Data and Statistics* (Hall, 1997) provides the techniques of analyzing data to characterize the fire problem. Most characterizations of the fire problem begin with some measure of the problem's size. Two approaches are most often used, the top - down approach, which provides the broadest approach, and the topic - driven analysis, which begins with certain issue involving certain types of fires. It is then very effective to subdivide the problem as it can help identify the critical elements and that resources are usually too limited to effect the whole problem at once and choices need to be made. (p.11-22)

The U.S. Fire Administration (USFA) in the publication *Fire in the United States 1985-1994* (1997) highlighted that the fire problem does vary from region to region and state to state because of possible variations in climate, poverty, education, demographic and other factors. (p.3) Based on the U.S. Fire Administration's Fire National Incident Reporting System (NFIRS) 1994 data, 71% of the fire deaths are now occurring in residences. The report also identifies careless smoking, arson, children playing with fire, and heating as the top contributing characteristics to fatal fires. The rank and order of these characteristics do vary from state to state. Therefore the priorities for prevention programs must be tailored to location and purpose. (p.3)

Socioeconomic at risk characteristics identified as being at the highest risk from fire were the very young and elderly, people either in rural areas and very large cities, and the poor. (p.7) The report also highlighted the occurrence of having no fatalities in a fire was much more likely when smoke detectors were present.

The report *The Rural Fire Problem in the United States* (USFA, 1997) noted several significant differences, after analysis, of the fire problem in rural vs. non-rural areas of the United States. The report defined “rural” for the purposes of its study as areas of counties having populations less than 20,000 that are not generally adjacent to a metropolitan area. The USFA report found the fire death rate, based on population, was 26% higher in rural areas than in non-rural areas within the United States. (p.43)

Contributing factors to this higher death rate was attributed to the lack of working smoke detectors. In rural areas 73% of the fires happened in homes without working detectors. (p.15) Heating was reported the leading cause of fatal rural residential fires at 26%, careless smoking at 23% and electrical distribution at 17%, rounding out the top three. In comparison, the USFA found smoking and arson were the leading causes of fatal fires in non-rural areas. (p.15) Finally, the USFA report showed that although rural fire death at risk groups followed similar patterns as non-rural areas, the rural fire death profile was slightly slanted to affect the young more than any other age group. (p.44)

In 1991, Chief James M. Nolan of the Anchorage Fire Department, in a applied research project submitted to the National Fire Academy titled *Identification of Target Audience to Reduce Fire Deaths in Anchorage, Alaska*, identified the at risk groups in that community from fire deaths. His research using data from 1980 to 1990, signaled that Anchorage’s fire problems was not necessarily following national “rural” trends or characteristics but was more urban in nature. In Anchorage, smoking and alcohol use was the leading cause of fire deaths, with the most at risk population being the 20-39 age group followed by the 0-12 group. (p.6) Nolan did not track race as a risk group in his study.

A 1982 study by Paul Gunther tied high rates of rural fire deaths to variations in climate and income. Uniquely, Gunther explained, the higher fire death rate in the southern states, as opposed to the northern states, (in the contiguous U.S.) has to do with heating systems. Since the climate is generally milder in the South, fewer households have central heating systems. This creates a greater reliance on less fire-safe heating methods such as room heaters, fireplaces, wood stoves, and portable heaters as primary heating sources. (p.34)

Frederick Clark (1982) adds additional factors that can compromise the rural fire safety record. Clark cites having no adherence to building codes and the greater use of low cost building designs and materials as significant contributors to the rural fire safety problem. (p.41)

Fahy and Norton (1989) identified two additional social-economic factors that distinguish rural households from their urban counterparts. Rural communities tend to have less income and resources dedicated to organized fire protection. Due to remoteness from what fire protection was available, response times are generally much longer in rural areas. (p.30) This same point was also identified in *America Burning* (1973) "It is appropriate to note the special plight of many of America's rural and suburban dwellers. As in urban areas, most rural fire deaths occur at night during sleeping hours. A few minutes awakening to a fire can be a matter of life or death. But what is especially critical for rural dwellers is if they awake belatedly and or get trapped, it may be many minutes before a fire department arrives to rescue them, if at all". (p.93)

In summary, the literature thoroughly demonstrated, through strategic analysis the fire problem in America has been characterized and improvements have been made. The literature also provided specific areas to investigate such as climate, rural, poverty, and socioeconomic factors, as well as, defining characteristics of the causes of fatal fires such as smoking, heating, electrical, arson, and children playing with fire which could very well show patterns by comparisons to understanding Alaska's poor record as well. The importance of the process of and to define the problem to be successful in injury and prevention type endeavors is stressed in the National Fire Academy's - *Strategic Analysis of Community Risk Reduction*. (NFA, 1997) Also, the writers of *America Burning*, recognized this importance to fire safety efforts back in 1973: "The efforts of individuals and organizations in the fire protection field have run against the twin tides of ignorance and indifference – tides which contribute substantially to the extraordinary magnitude of the fire problem in the United States. While genuine economic problems often stand in the way of deeper investment in fire protection, the lack of understanding of fire's threat helps to account for the low priority given fire protection." (NCFPC, p.2)

PROCEDURES

To answer the three questions of this applied research project the historical and evaluative methodologies were used. Research through literature review was used to identify the potential characteristics that could be expected in an analysis of the Alaska fire deaths. Once the potential influencing factors were thought to be identified in relation to this

project, this researcher was able to find national and state data for comparison of those characteristics for an evaluative analysis in an attempt to answer the research questions.

Literature Research Methodology

Initial research was conducted at the Learning Resource Center at the National Fire Academy in Emmitsburg, Maryland. Additional materials were ordered from the United State Fire Administration also in Emmitsburg, Maryland. The University of Alaska Library provided materials pertinent to Alaska. Extensive related material was found on the Internet at the following sites U.S. Fire Administration Fire Data Center (www.usfa.fema.gov/nfdc); The National Center for Injury Prevention and Control (www.cdc.gov/ncipc); and the National Fire Protection Association (www.nfpa.org).

Selection of Comparison States

After identifying possible unique characteristics that could effect Alaska's fire deaths, the next task was to identify states with potential similar situations for an evaluative comparison with Alaska. States were sought in the following groupings: coldest climate, highest fire deaths, most rural, and assumed closest in social and political in nature - the Pacific Northwest.

The states for climatic comparisons were selected by using Comparative Climatic Data Tables from the National Oceanic and Atmospheric Administrations (NOAA) National

Climatic Data Center (NCDL) website (www.ncdc.noaa.gov). Climate's main impact to fire deaths, through the literature review, is thought to be that of heating the home required to stay warm. Annual heating degree-days data was used find the state with the severest climate in respect to fire safety. Degree days is the amount of estimated energy required to maintain comfortable indoor temperature levels at a base of 65 degrees Fahrenheit. The data was collected at NOAA weather sites and averaged over 30 years to get a climatic norm for each state. As weather from each station within state can vary, especially in larger states or those who have several climatic zones this researcher totaled all weather data site for each state and took the state average with the assumption that NOAA weather sites were located in respect to population bases and as required to measure weather extremes in each state.

The states for rural comparisons were selected by using Land Area, Population, and Density for States and Counties Data tables from the U.S. Census Bureau website (www.census.gov). Population density per square mile was used as the selection statistic. Although not selected on this basis, the states percentage of population living outside of urban areas, was also used to characterize the wide-open spaces of the state. The purpose of this comparison is during the research is, that it became obvious, that gross statewide population density although, a good indicator of the potential for wide-open spaces, did not directly relate to a state population living in a rural area. The percentage of population of individuals in a state living outside of communities, counties or boroughs, with populations of 2500, or greater per the U.S. Census Bureau Population Data, provides this measure of the rural factor, felt to be important as to include in this research.

To perform a comparative analysis of the selected states fire death rates and where they were occurring, data was obtained from the U.S. Fire Administration's National Fire Data Center website (www.usfa.fema.gov/nfdc). The data center is a data repository for the National Fire Incident Reporting System known as NFIRS. It should be noted that NFIRS is a voluntary fire incident data collection system. A majority of the nation's fire departments participate in this system by completing individual incident report forms, which are collected by each state's lead fire reporting agency, usually the state's fire marshals office. The data is then forwarded to the U. S. Fire Administration National Fire Data Center to be included in the NFIRS database. Although the most comprehensive of any fire tracking data in the United States, NFIRS data is not complete, it is highly dependent on individual departments and fire officers attention to completing the NFIRS reports. Due to this limitation, the National Fire Data Center's national and some state figures used in this research, are estimates rather than absolutes. These estimates were formulated by the National Fire Data Center using NFIRS data percentages computed along with a random national survey performed by the National Fire Protection Association. It also needs to be noted that the percentage of fire departments participating from state to state, with some state not participating at all, can and did have an impact on this research. Cases in point, the States of Maine, Mississippi, North Dakota, and Nevada were originally selected as comparable to Alaska in one or more of the chosen categories. However, these states do not, nor had not, participated in the NFIRS system during the research years, leaving necessary data lacking, thus alternative states had to be chosen for this study.

Data Methodology

To quantify the fire death rate in the selected states, a five-year sample period, from 1991 to 1995 of NFIRS information was used. This range was used as it was found to be the most complete and up to date at the time of this research. A five year annual average was selected for making state to state comparisons. Casual observation of the data tables revealed that especially in smaller populated states, there was the potential for a wide variance of incidents from year to year. Since this study was focused on rural and lesser-populated areas, averaging over a five-year period it was thought to reduce anomalies caused by a smaller sample size. Five years was also the study range used in the 1984 study *Alaska Public Safety Crises* (TFFPC). Data was tabulated and a five-year annual average was calculated for deaths per 1000 fires, deaths per 100,000 population, and the percentage of fire deaths occurring in residential occupancies.

To determine the relative poverty that may effect this study of fire deaths in the comparable states, data from the U.S. Census Bureau's Standard Data Series of Poverty Statistics by State was used. The percent of people in poverty of each state was determined by a three-year average of the data for 1993 –1995. The definition or measurement of poverty used by the Census Bureau is the standard set by the Social Security Administration. This measure has a set of levels, or thresholds, that are compared with families' resources to determine whether or not they are classified as above or below the poverty level. The thresholds differ by the number of adults and children in a family and,

for some family types, by the age of the family head. The resources are families' annual, before-tax, income.

Researching the significant characteristics of Alaska's fire death rate was through review of previous research articles, and papers, along with the analysis of the Alaska State Fire Marshal's fire death database. This database is unique in that its information collection was started many years before ANFIRS and NIFRS was developed and is also thought to be more complete than the voluntarily obtained NIFRS information. Individuals within the Alaska State Fire Marshal's office many years ago started tracking fire death reports in Alaska. They recorded the date, community, cause of a fatal fire (if known), and if a smoke detector was involved and working, along with the name, sex, age and race of the victims of every fatal fire in Alaska. This effort originally started on a notebook, was then transferred to a database program in recent years. Information is obtained by firsthand reports, news articles, and of course, ANIFRS reports when available. The significance of this database is the individual and professional commitment to make it complete and available for research such as this.

For studying fire death characteristics, a research period of ten-years from 1988 to 1997 was selected, as it was the most current data in complete years. This study period overlapped with the five-year study period selected for the comparison of NFIRS state data, and was a long enough duration to create significant confidence to the characteristics contributing to Alaska's fire deaths. The database was used to tabulate and evaluate the timing of Alaska's fire deaths, by month, and where the fire deaths were occurring - urban,

rural, or bush areas. What was the significant reported cause of these fires, the race of the victims, and finally, were smoke detectors a factor?

RESULTS

Figure 1: Comparative Analysis of Alaska's Fire Deaths

	1. Deaths per 1000 Fires	2. Fire Deaths per 100,000 pop.	3. % of Fire Deaths that Occur in Residences	4. Pop. Density per square mile	5. % of Pop. living in non-urban areas	6. Annual Heating days (Base 65)	7. % Pop. with "Poverty" Classification
U.S. Average	2.30	1.11	81.0%	70.5	24.8	N/A	13.1%
Alaska	7.22	3.31	87.0%	1.0	32.5	12,874	9.0%
High Fire States							
Alabama	3.50	2.45	76.0%	79.6	39.6	2,542	18.3%
Arkansas	3.38	2.30	71.0%	45.1	46.5	3,287	19.1%
Cold Climate States							
Wisconsin	2.26	1.11	73.0%	90.1	34.3	7,644	10.7%
Minnesota	3.52	1.23	68.0%	55.0	30.1	9,093	10.2%
Rural States							
Wyoming	1.94	0.62	38.0%	4.7	35	7,675	11.9%
Montana	4.03	1.04	57.0%	5.5	47.5	7,798	16.1%
Geo-Political: Pacific Northwest States							
Idaho	2.84	0.89	73.0%	12.2	42.6	6,104	13.3%
Oregon	3.49	1.17	75.0%	73.1	29.5	5,263	12.4%
Washington	0.44	0.91	74.0%	29.6	23.6	5,640	10.9%

1. Data source: U.S. Fire Administration National Data Center State NFIRS profiles. Average of years 1991-1995.
2. Data source: U.S. Fire Administration National Data Center State NFIRS profiles. Average of years 1991-1995.
3. Data source: U.S. Fire Administration National Data Center State NFIRS profiles. Average of years 1991-1995.
4. Data source: U.S. Census Bureau Land Area, population and density 1990.
5. Data source: U.S. Census Bureau.
6. Data source: U.S. National Oceanic and Atmospheric Administration National Climate Data Center.
7. Data source: U.S. Census Bureau.

During the five-year study period of the comparative analysis, Alaska had the highest fire death rate in the nation, by any measure. Fatalities from fire in Alaska was determine to

be at 3.31 per 100,000 persons which was roughly three times (298%) higher than the national average rate of 1.11 per 100,000 persons during the same period. Alabama, classified as a high fire death state in this study, and the second leading state in fire fatalities, had roughly double the national average rate at 2.45 per 100,000 persons, but lower than Alaska's rate by a third. Arkansas, the other comparable in this classification, was a close third to Alabama with 2.30 deaths per 100,000 persons. All other states in this comparative study were within 20% of the national average. Wyoming, a rural comparable state, was lower than the national average, and had the lowest death rate in the study at .62 per 100,000.

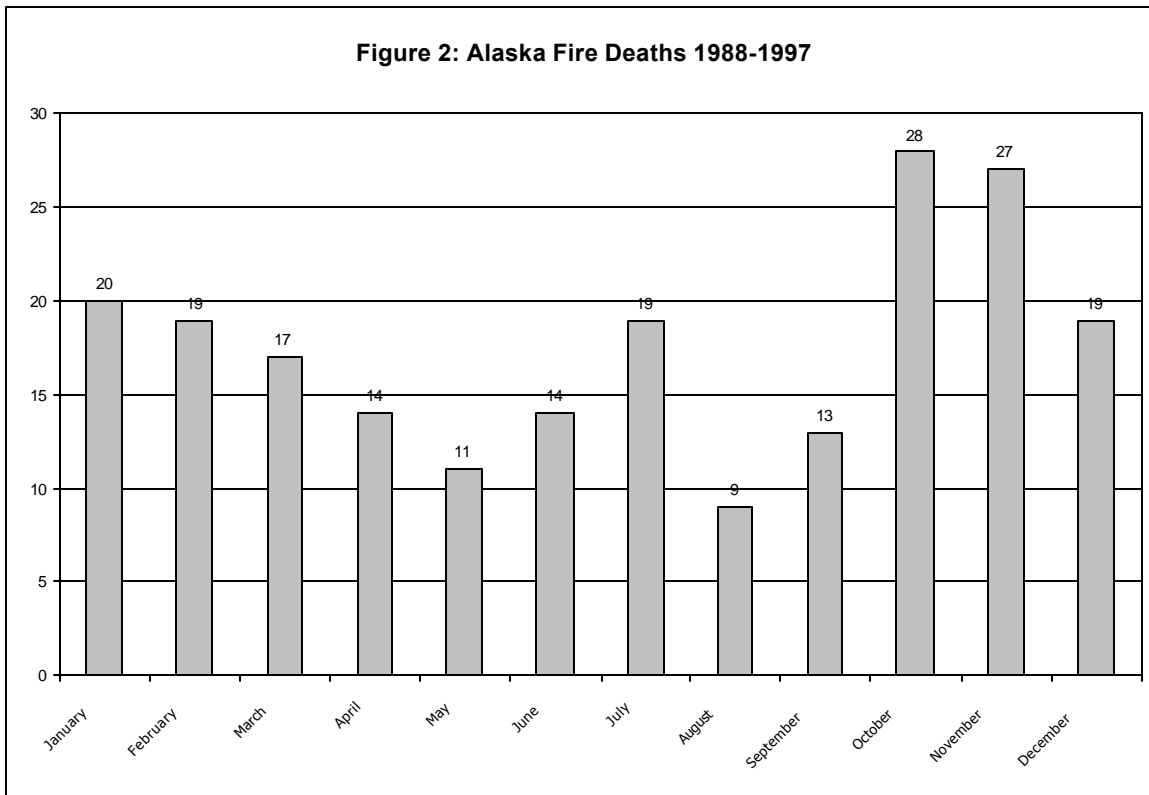
Severity of fires was measured by the rate of deaths per 1000 fires. The Alaskan five-year average rate of 7.22 per 1000, again, was three times higher (313%) than the national average of 2.30 per 1000. This fact indicates, on the average, that a fire in Alaska is three times as likely to kill then elsewhere. Alabama and Arkansas had a lower rate of 3.50 and 3.38 respectively indicating that fires, in those high fire death states, are only half as likely to kill as in comparison to Alaska. This finding is significant as it points to fire survivability, after the fire has started as a point of focus for describing Alaska's fire problem. It should also be noted that Montana, Minnesota, and Oregon, each in a different comparison group in this analysis, also had fire severity rates higher than those in the high fire loss states, with the exception, of course, of Alaska.

Rural states from the data had the lowest percentage of fire fatalities occurring in the residence. This was 30-50%, lower than the national average. In fact, all states in this study

had residential fire death rates less than the national average with one exception, Alaska. Eighty-seven percent of all fire deaths in Alaska are occurring in the home.

Alaska's size and population, with a density of one person per square mile, could make Alaska the most rural state in this study, and the nation. However, closer examination of the population distribution in column 5 of Figure 1 shows that only one-third (32.5%) of Alaskan citizens live in rural or remote locations. The other two-thirds majority live in major urban areas of the state. Alabama, Arkansas, Wisconsin, Wyoming, Montana, and Idaho all had a greater proportion of their populations in rural areas outside of urban areas. This comparison shows that Alaska has two very distinct communities, one urban, and one small and very widely distributed very substantial distances.

The Alaska climate was by far the severest of all states in this analysis with a climate that requires 41% more annual heating degree-days to keep a home at 65 degrees Fahrenheit, than the next coldest climate in the study, Minnesota. Conversely, Alaska had the lowest percentage, of any state in this study, of citizens in poverty, as measured by the U.S. Census Bureau. It was 40% lower than the national average. The other high fire death comparable states of Alabama and Arkansas did have the highest rates of poverty, were at least double the Alaskan poverty rate. These findings indicate that climate may have an impact however poverty does not when it comes to Alaska's high fire death rates.



Data source: Alaska State Fire Marshal

Over the ten year-study period, the months of October and November were the highest fire death rate months in Alaska, having 29% more fire deaths than the colder midwinter months of December, January, and February. Overall, the winter months had higher fire death deaths rate than the summer months. There is an unexplained midsummer rise in fire deaths almost equaling midwinter rates.

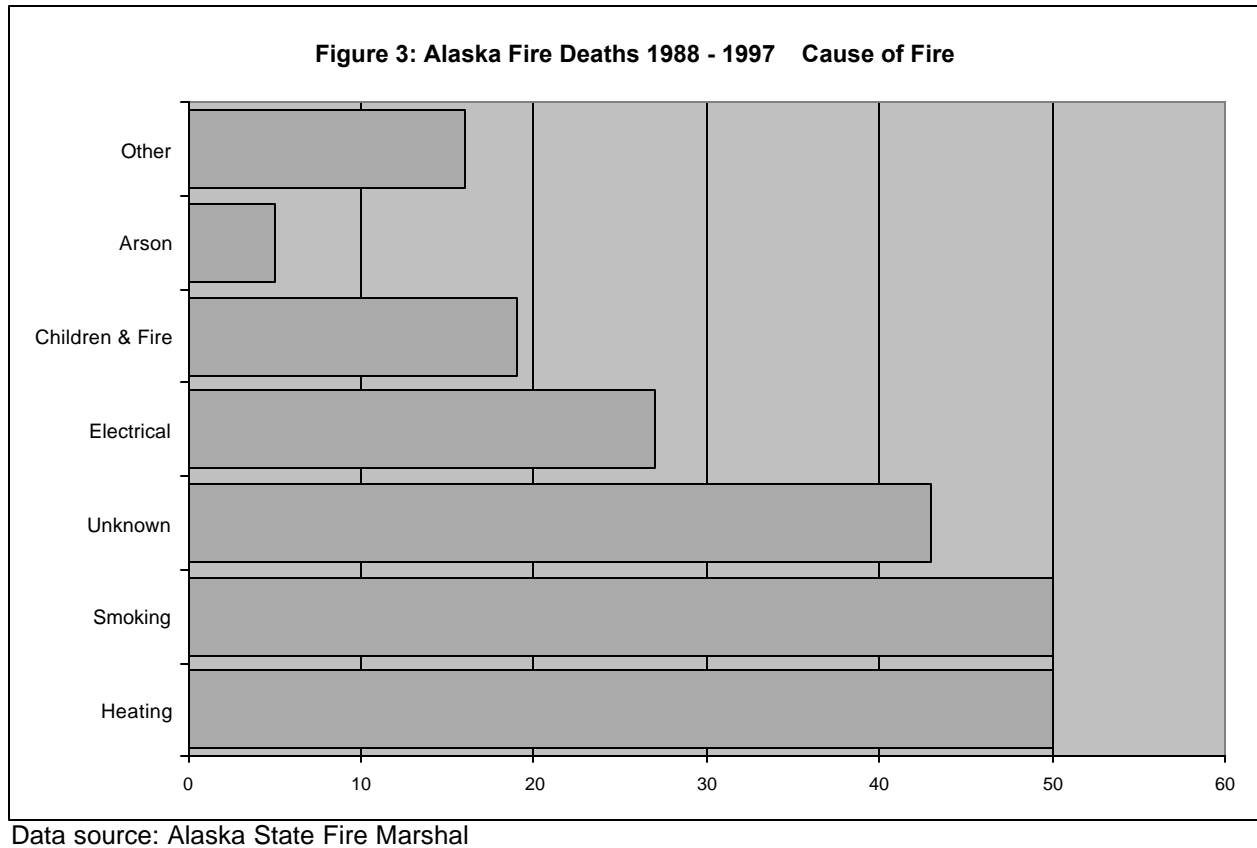
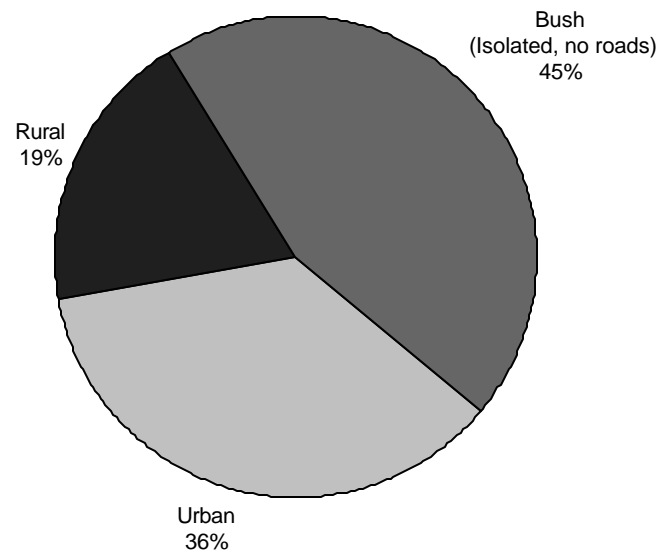


Figure 3 shows the tabulation of the documented causes of fires in Alaska during the ten-year study period the resulted in a fire fatality. Heating and smoking were evenly the most significant causes together accounting for 100 out of the 210 (48%) fatal fires almost half, of fires resulting in death in Alaska. Electrical caused 27 (13%) fatal fire were third highest known cause. Children and fire were the result of 19 (9%) fire deaths. Other causes not specifically classified (such as motor vehicle accidents, wildland fires, industrial processes etc.) contributed to 16 (8%) of fire fatalities. In Alaska, arson was the least known cause of fatalities contributing to only 5 (2%) of the fire deaths in the state. One fifth, or

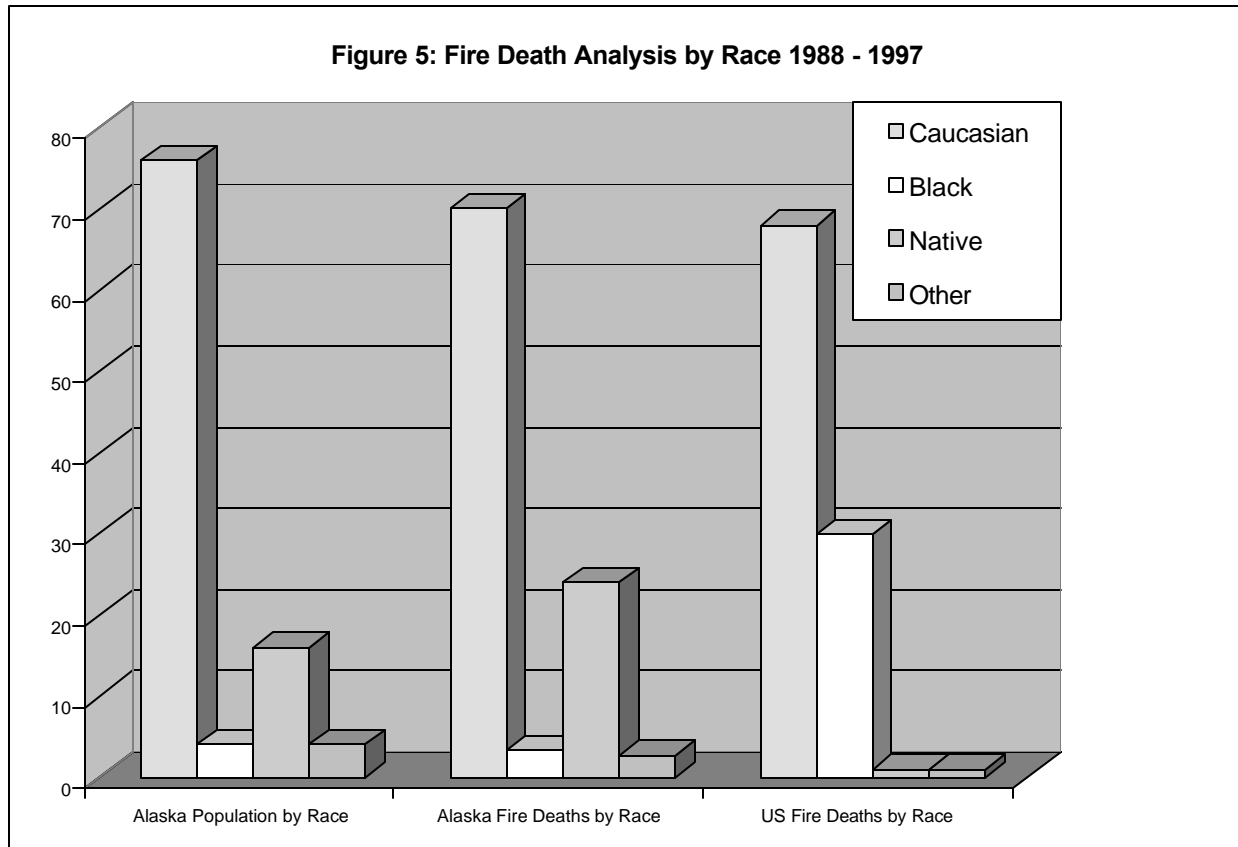
20% of fires in Alaska that cause death, go undetermined or have unknown causes. This factor must be kept in consideration when interpreting this analysis.

Figure 4: Alaska Fire Deaths 1988 - 1997 Community Character



Data source: Alaska State Fire Marshal

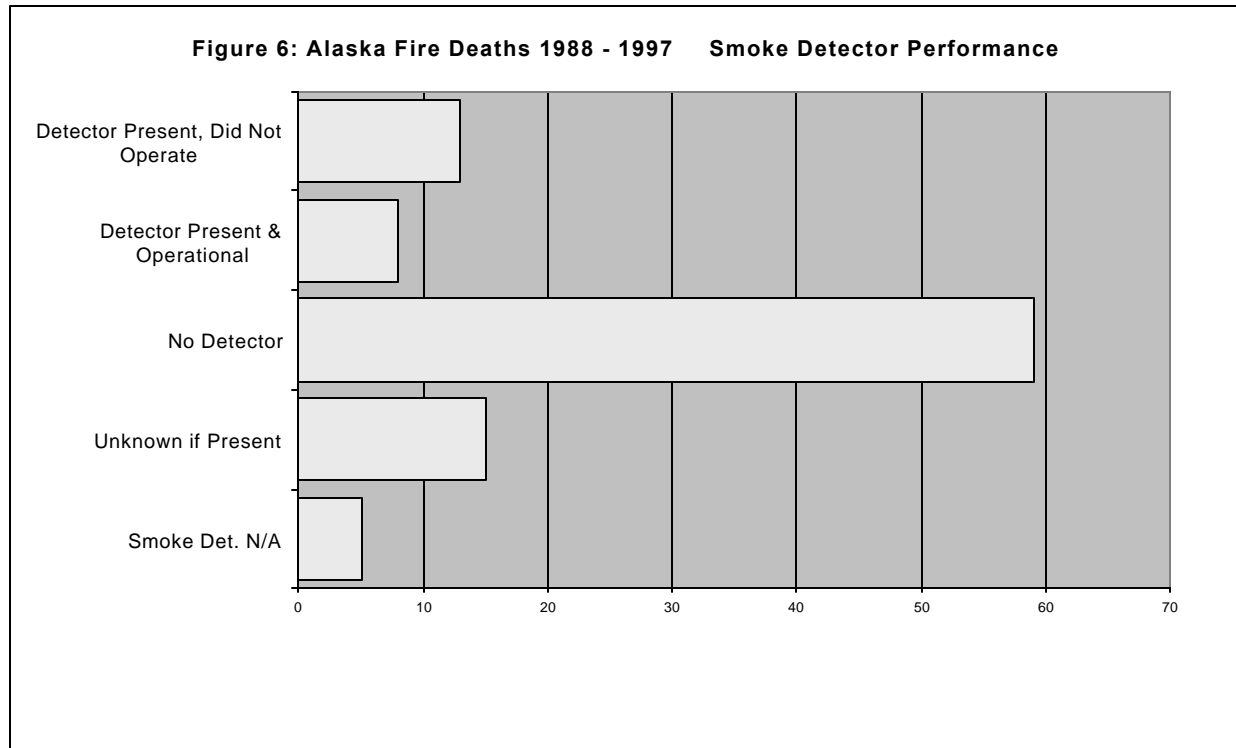
Forty-five percent of Alaska's fire fatalities are occurring in bush communities and other remote areas of the state. Alaska's urban areas, where over two-thirds the state's population lives, account for 36% of fire deaths. Rural areas, outside the urban areas but connected via road transportation, only accounted for the remaining 19% of fire deaths.



Data sources: U.S. Census Bureau; Alaska State Fire Marshal; U.S. Fire Administration

Caucasian Alaskans, as a race, had by far, the highest percentage of death from fire at 70% of all fire deaths. Alaskan Native people are at 23% higher risk from fire than their Native American counterparts located in the rest of the nation. The Alaskan Native population also had a higher incidence of fire deaths than their population segments. Alaskan Natives making up 16% of Alaska's population, have 24 % fire fatalities. African American and other ethnic groups had less fire deaths when compared to the population segment in Alaska and those same minorities nationally. Together, African American and

other non-native minorities accounted for less than 6% of Alaska's fire deaths during the study period.



Data source: Alaska State Fire Marshal

Figure 6 shows that 59% of Alaskan fire deaths occurred in homes that did not have at least one smoke detector. This increased to 72% with the addition of fatal incidents that occurred where smoke detectors were disabled or did not function. This could be as high as 88% if it is assumed that the fatal fires classified as unknown also did not have working smoke detectors.

DISCUSSION

This applied research project sought to analyze Alaska's fire death problem as it most recently exists by identification and evaluation of significant characteristics and comparison. In answering the research questions, it should be noted that little has changed in the magnitude of Alaska's problem in the last fifteen years since the most notable previous studies and reports, *Alaska on Fire* (TFFP 1982) and *Alaska's Public Safety Crisis*, (TFFP 1984) were made to the Alaska state legislature. In comparison, the national fire problem has seen improvement of over 38% during the same period. (USFA, 1997 p.2)

Climate was found by casual comparison of the states in this study to be an influencing factor in Alaska's fire deaths as heating being the top known cause of fatal fires, along with smoking, followed by electrical causes. The national pattern for the leading known causes of fire resulting in fire death is smoking, arson, and then heating third, (USFA, 1997 p. 60) indicating increased heating degree-days does have an impact. Interestingly, however, it was also found that climate need not be the cause for Alaska's high fire deaths. Again, through casual comparison, cold weather states in this study had 67 to 70% less fire deaths per 100,000 population than Alaska. The Alaskan climate, obviously the coldest of all states, has 41% more annual degree heating days than the other cold weather states in this study. Review of the time of year of Alaska's fire death occurrences also reinforced this observation. National data showed that 40% of all fire deaths occur in the severest heating months December to February (USFA, 1997 p. 73). This study's results for Alaska in the same time period was 28% with significantly higher

early fall fire deaths and surprisingly a high level during the spring and summer also.

Nolan's (1991) earlier research on the Anchorage, Alaska community also identified the same midsummer jump in fire deaths. The higher death rates for the Alaskan fall could indicate the inadequacies of some Alaskan heating systems going into winter.

Several authors and publications have cited poverty, not as a cause of increased fire problems, but rather a reliable indicator of social-economic factors that do contribute to an increased fire problem. However, poverty is still often use as an significant indicator. Alabama and Arkansas in the high fire fatality state comparable, did also have twice the poverty as the other states in the study. This study can, however, discount that poverty in Alaska, in its traditional measurement, is not a primary reason for the state's above average fire death rate in comparison with the rest of the nation. In fact, the data showed that Alaska has one of the lowest statewide rates of poverty in the nation per accepted standards of measure. In doing this research project, some areas of socioeconomic factors normally highlighted by high poverty rates looked to warrant further investigation. This was primarily in the form of housing and building stock. The condition of Alaskan housing may be contributing to its high fire death rate. This study found heating and electrical as two of the three most significant known causes of fatal fires in Alaska, along with the finding that 72% of fire deaths in Alaska happen in residential home without a working smoke detector. The state of Alaskan housing may be further confirmed by data from the U.S. Census Bureau's 1990 Census on Housing which showed that homes in Alaska are 12 times more likely than the national average not to have complete plumbing facilities. Although lack of plumbing does not cause fires, this seemly-unrelated fact may

be a clue to the state of Alaskan housing. Are efforts toward a more fire resistive and safe dwelling a top priority when daily needs may be more tasking?

America Burning (1973), cited that rural areas can have many problems; like poverty does not cause fires in itself, but could be a significant factor to the overall fire problem, most notable the lack of fire protection resources. (p. 93) This viewpoint was found prevalent in the fire service thinking at the Alaskan level also. (TFFP, 1984) This research found that rural areas do not necessarily directly relate to high fire death rates. The states with the least population density and the most residents living outside of urban areas, per U.S. Census bureau definitions in this study also had lower fire death rates than the national average, with the exception of Alaska. When considering just residential fire deaths, the rural comparison states were much lower than the national average of fire deaths by 30 to 50%. This could mean rural residents are actually safer in their homes than their urban counterparts. This finding counters the traditional fire service thinking that limited fire protection resources in rural areas means higher death rates. In Alaska, rural and bush communities did contribute to a higher death rate. These communities had 64% of the fire deaths during the study period when only 32% of the population lived in these non-urban areas of the state. The conclusion can be made that in Alaska the death from fire is more significant in the rural and remote areas of the state. However, by comparison to other states with wide-open spaces and small communities this in itself was not the reason for an increased fire problem or threat to life.

This research did provide some not originally sought after clues to the Alaska fire problem. First, it was noted, that in Alaska, the portion of fire deaths occurring in residential

occupancies was 6% higher than the national average. All other states in the study were less but relatively equal - 6 to 10% less than the national residential fire rate with the exception noted above for the rural states, which were even lower. This finding leads this researcher that to believe that part of Alaska's extraordinary fire problem is in the home. Second, it was noted that Alaska's fire deaths were relatively high all year round with a slight increase during winter months and a substantial spike in the fall months. High fire deaths in the summer months were an unexpected finding. Although this researcher specifically can not answer, Nolan (1991) in his research of Anchorage, Alaska fire deaths from 1980 to 1990 found a similar high summer death rate. He attributed this to smoking and alcohol. (p.13) Chief Nolan, in studying his urban jurisdiction, also found smoking, by a far margin, the leading cause of fire deaths, contrasting this study of the whole state of Alaska.

The implication, of this study is, that Alaska's high fire death rate may be of our own doing. A serious look at Alaskan housing needs to be done to insure it is meeting the challenges of our unique climate and finally, the safety of our families. Deficiencies in housing design, or by omission, such as when there is a lack of effective codes for residential properties in Alaska, or by the extreme independent nature of Alaskans, may be resulting in fire deaths as demonstrated in this study. Alaskans very well could be preoccupied with more immediate daily needs such as water, shelter and warmth to spend time protecting their homes from fire. Smoking was the major behavioral characteristic given much significance in this study as major a contributing factor to Alaska's high fire death rate. Alcohol use amplifies the destructive potential of this characteristic shown in Nolan's (1991) study. Arson, cooking and children playing with fire were not major

contributors to Alaska's fire death problem. To be effective, fire prevention programs will need to be comprehensive and specifically address the issues that will make a difference in Alaska. More immediate in nature is that smoke detector use and maintenance is dismal in Alaska according to the fire death statistics in this analysis. If there is one issue this study can highlight, it is that of working smoke detectors. If every home in Alaska had one, the fire problem may not have been resolved, but there would be a significant reduction in fire deaths.

RECOMMENDATIONS

The purpose of this research project was to define the significant characteristics of the Alaska fire fatality problem. Using this information, a risk reduction plan can be developed to prevent the occurrence of fires that are most likely to result in death and/or minimize the consequences of such fires with select strategies and tactics for Alaska's specific challenges. These recommendations are made as a result of this analysis of Alaska's high fire death rate:

1. Through conventional and innovative means, assure at least one working smoke detector in every Alaskan home.
2. Build fire prevention coalitions and partnerships with community groups, Native Corporations, developers, builders, home heating trade and craft groups, finance institutions, insurance industry, real estate agents, property rental industry, suppliers and merchants, and government agencies, to promote safe Alaska housing.

3. Revisit current fire prevention efforts and evaluate to see if they are an efficient use of resources towards the Alaska's fire problem as identified in this study. From that evaluation should come distinct and targeted intervention strategies. These strategies should include education and behavior changes for Alaskans, policy interventions required by government, and engineering and technology implementation required for safe housing, assuring home smoke detectors, and the reduction in the negative effects of smoking and alcohol.

4. Re-think statewide efforts on fire protection. A community coalition should participate in this effort, not just fire protection "officials" as in the past. Differentiate the efforts that effectively protect property from those that protect lives. Although both are very worthwhile efforts, the life safety must take precedence.

REFERENCES

Alaska Fire Chiefs Association (1998, February). *1998 Review of Alaska's Fire Protection System and Legislative Platform*. Unpublished report to the State Legislature.

Centers for Disease Control and Prevention. (1998, October). *Deaths Resulting from Residential Fires and the Prevalence of Smoke Alarms – United States, 1991-1995*. Atlanta, Georgia: U.S. Department of Health and Human Services, CDC, National Center for Injury Prevention and Control, Morbidity and Mortality Weekly Report. p. 803 - 806.

Clark, Frederick E. (1982, July). Fire Safety in Rural America. *Fire Journal*, pp.40-41; pp.105-106.

Fahy, Rita. F. & Norton, Alison. L. (1989, January/February). How Being Poor Effects Fire Risk. *Fire Journal*, p.29.

Gunther, Paul. (1981, May). Fire-Cause Patterns for Different Socioeconomic Neighborhoods in Toledo, Ohio. *Fire Journal*, p. 52.

Hall, J.R. & Cote, A.E. (1997). *America's Fire Problem and Fire Protection*. In A.C. Cote (Ed.) *Fire Protection Handbook* (p.1-1 to 1-25). Quincy, MA: National Fire Protection Association.

Hall, J.R. & Cote, A.E. (1997). *Use of Fire Incident Data and Statistics* . In A.C. Cote (Ed.) *Fire Protection Handbook* (p.11-21 to 1-96). Quincy, MA: National Fire Protection Association.

National Commission on Fire Prevention and Control, (1973). *America Burning*. Washington, D.C.: U.S. Government Printing Office.

National Fire Academy. (1997, April). Strategic Analysis of Community Risk Reduction. (Student manual). Emmitsburg, MD: National Fire Academy.

Nolan, James M. (1991, November). *Identification of Target Audience to Reduce Fire Deaths in Anchorage, Alaska*. (Executive Fire Officer Applied Research Project). Emmitsburg, MD: National Fire Academy.

Task Force on Fire Prevention and Control (1982, June). *Alaska on Fire*. Juneau Alaska: State of Alaska.

Task Force on Fire Prevention and Control (1984, December). *Fire: Alaska's Public Safety Crisis*. Juneau Alaska: State of Alaska.

United States Fire Administration. (1993). *Fire in the United States, 1985 – 1994*. Washington, D.C.: Federal Emergency Management Agency, United States Fire Administration.

United States Fire Administration. (1997, June). *Socioeconomic Factors and the Incidence of Fire*. Washington, D.C.: Federal Emergency Management Agency, United States Fire Administration.

United States Fire Administration. (1997, May). *Fire Death Rate Trends: An International Perspective*. Washington, D.C.: Federal Emergency Management Agency, United States Fire Administration.

United States Fire Administration. (1997, August). *The Rural Fire Problem in the United States*. Washington, D.C.: Federal Emergency Management Agency, United States Fire Administration.